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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/750,946	01/05/2004	Nobuyuki Ishiwata	8053-1003-1	2058

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EXAMINER

VERSTEEG, STEVEN H

ART UNIT PAPER NUMBER

1753

DATE MAILED: 09/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/750,946

**Applicant(s)**

ISHIWATA ET AL.

**Examiner**

Steven H. VerSteege

**Art Unit**

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 05 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 January 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☒ Certified copies of the priority documents have been received in Application No. 09/466,810.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>1/5/04</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Priority*

1. An application in which the benefits of an earlier application are desired must contain a specific reference to the prior application(s) in the first sentence(s) of the specification or in an application data sheet by identifying the prior application by application number (37 CFR 1.78(a)(2) and (a)(5)). If the prior application is a non-provisional application, the specific reference must also include the relationship (i.e., continuation, divisional, or continuation-in-part) between the applications except when the reference is to a prior application of a CPA assigned the same application number.

### *Drawings*

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: **1404** and **1405** (see Figure 14). Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Specification***

3. The disclosure is objected to because of the following informalities: "layer" should be "later" on page 6 at line 31.

Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 10 and 11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. The term "spin valve type structure" in claim 10 is a relative term which renders the claim indefinite. The term "spin valve type structure" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. It is the word "type" that renders the claim indefinite.

7. The term "tunneling magnetoresistance type structure" in claim 11 is a relative term which renders the claim indefinite. The term "tunneling magnetoresistance type structure" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. It is the word "type" that renders the claim indefinite.

*Claim Rejections - 35 USC § 103*

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 1-3, 5, 6, and 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,007,731 to Han et al. (Han) in view of US 2002/0089794 A1 to Chang et al. (Chang).

10. For claim 1, Applicant requires a method for manufacturing a magnetoresistance apparatus comprising forming a magnetoresistance elements layer; forming a photoresist pattern on the magnetoresistance element layer; etching the magnetoresistance element layer by using the photoresist pattern as a mask; and depositing a side layer by an ion beam sputtering process using the photoresist pattern as a mask after the magnetoresistance element layer is etched.

11. Han discloses forming a magnetoresistive sensor element (abstract) comprising forming a magnetoresistance element layer 20, forming a photoresist pattern 22 on the magnetoresistance element layer; etching the magnetoresistance element using the photoresist as a mask (col. 8, l. 42-49); and PVD sputter depositing side layers (col. 11, l. 5-15).

12. Han does not disclose the sputter depositing to be ion beam sputter deposition.

13. Chang discloses forming a magnetoresistive spin valve element (abstract) wherein the conventional deposition involves ion beam sputter deposition using argon or xenon and the conventional etching involves ion beam etching using the same chamber for both removal and deposition [0051].

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14. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Han to utilize the ion beam deposition of Chang because of the knowledge that it is the conventional deposition method within the art of magnetoresistance element manufacture.

15. For claim 2, Applicant requires the photoresist pattern to have a lower pattern and an upper pattern with the lower pattern having a smaller area. Han discloses the limitation (Figure 2).

16. For claim 3, Applicant requires the lower pattern to be approximately 0.05-0.3 microns. Han discloses the limitation to be 0.1 microns (col. 8, l. 30-36).

17. For claim 5, Applicant requires the ion beam sputtering to be Ar ion beams. For claim 6, Applicant requires the ion beam sputtering to be Xe ion beams. As noted above, Chang discloses the limitations.

18. For claim 8, Applicant requires the etching step to be ion beam etching. As noted above, Chang discloses the ion beam etching is the conventional etching method in magnetoresistance element manufacture and thus is obvious to one of ordinary skill in the art.

19. For claim 9, Applicant requires the etching step and deposition step to be carried out in one chamber without exposing the apparatus to air. As noted above, Chang discloses the limitation.

20. For claim 10, Applicant requires the magnetoresistance element layer to comprise a spin valve structure and the side layer to comprise a permanent magnet layer and an electrode layer formed on the permanent magnet layer. Chang discloses forming a spin valve wherein a

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ferromagnetic layer with an electrically conductive spacer layer is formed thereon to make a spin valve [0055].

21. For claim 11, Applicant requires the magnetoresistance element layer to comprise a tunneling magnetoresistance structure wherein the side layer comprises an insulating layer and a permanent magnet layer formed on the insulating layer and forming an electrode layer on the tunneling magnetoresistance structure. Chang discloses forming an insulating layer with a ferromagnetic layer above the insulating layer and an electrically conductive spacer layer is formed thereon [0055].

22. Claims 4 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,007,731 to Han et al. (Han) in view of US 2002/0089794 A1 to Chang et al. (Chang) as applied to claim 1 above, and further in view of US 6,483,677 B2 to Nakatani et al. (Nakatani).

23. For claim 4, Applicant requires the gas pressure for the sputtering to be about  $4 \times 10^{-4}$  to  $4 \times 10^{-2}$  Pa. For claim 7, Applicant requires the distance between the target and substrate to be approximately 20-100 cm.

24. Han in view of Chang is described above but does not disclose the sputtering pressure or the target to substrate distance.

25. Nakatani discloses a method of making a magnetoresistance effect element in which the sputtering pressure for an argon ion beam sputtering system is  $2.5 \times 10^{-2}$  Pa and the target to substrate distance is 127 mm (col. 8, l. 21-30).

26. Because Han and Chang do not disclose the specifics of the target to substrate distance or the sputtering pressure, it is inherent that any workable pressure and distance may be used.

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27. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Han in view of Chang to utilize a substrate to target distance of 127 mm and a sputtering pressure of  $2.5 \times 10^{-2}$  Pa because of the knowledge that success has been achieved in deposition under such conditions for making a magnetoresistance effect element. Thus, one of ordinary skill in the art would not have undue experimentation to achieve the desired results and would have a reasonable probability of success.

### ***General Information***

For general status inquiries on applications not having received a first action on the merits, please contact the Technology Center 1700 receptionist at (571) 272-1700.

For inquiries involving Recovery of lost papers & cases, sending out missing papers, resetting shortened statutory periods, or for restarting the shortened statutory period for response, please contact Denis Boyd at (571) 272-0992.

For general inquiries such as fees, hours of operation, and employee location, please contact the Technology Center 1700 receptionist at (571) 272-1300.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven H. VerSteeg whose telephone number is (571) 272-1348. The examiner can normally be reached on Mon - Thurs (6:30 AM - 5:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Steven H VerSteeg  
Primary Examiner  
Art Unit 1753

shv

August 29, 2005